Installation of Oxygen in Tracy Fish Collection Facility Holding Tanks

Investigators

Bryan Heiner
Hydraulic Engineer
Hydraulic Investigations and Laboratory Services
bheiner@usbr.gov

Dale Lentz
Hydraulic Engineer
Hydraulic Investigations and Laboratory Services
dlentz@usbr.gov

Summary

This study will investigate the installation of oxygen addition to the current Tracy Fish Collection Facility (TFCF) holding tanks. As temperatures increase, dissolved oxygen (DO) saturation is reduced (Wedemyer 2001), thus as the temperature increases at TFCF, the DO concentrations in the water at TFCF is reduced. Historically, from April–September, influent DO concentrations entering the tanks have dropped below 5 ppm (USBR 2010). When this occurs, the DO in the holding tanks is also limited. For many fish species present at the TFCF, DO concentrations above 7 ppm are recommended for holding (B. Bridges 2010, personal communication). When DO drops below this level, the chance fish have of surviving the fish collection process is reduced. Adding oxygen to raise the DO concentrations can increase fish survival. Many techniques and methods are commercially available which allow DO to be increased by either natural methods or by adding pure oxygen directly to the tanks. Many of these techniques were investigated during an evaluation study conducted in FY 2011. Although many systems were evaluated, only a few of them are possible to install at the TFCF. This research will determine the most practical method and best placement for installing equipment that will increase the DO in the existing holding tanks. Once placement and method are determined, oxygen addition will be added to at least two of the holding tanks and monitored to ensure performance criteria are being met.

Problem Statement

For fish survival, DO concentrations in the existing holding tanks should be 7 ppm. As mentioned previously, it is possible during hot weather for DO concentrations in the holding tanks to drop below 5 ppm. As a result, to help fish have the best chance of surviving the collection process, oxygen needs to be added to the holding tanks. During a previous study, it was determined that the best method for adding oxygen to the existing holding tank would be to inject water supersaturated with oxygen into the tanks. As the supersaturated water mixes with the holding tank water DO levels increase. This project will help the TFCF determine which method for injecting supersaturated water will best fit the system and where the best installation placement is. Once the equipment

and placement are determined, field testing will commence on two of the holding tanks to determine if DO levels are increased to acceptable levels.

Goals and Hypotheses

Goals:

1. Determine the best method for injecting water supersaturated with oxygen into the existing holding tanks.

Hypotheses:

1. If it is possible to fit necessary equipment for injecting supersaturated water into the existing holding tanks, then DO in the holding tanks will be increased to an acceptable level.

Materials and Methods

Once research engineers select the appropriate equipment for increasing the DO in the existing holding tanks, field implementation will occur. Two of the existing holding tanks will be retrofitted with the necessary equipment. Following the installation, field monitoring between existing tanks with and without DO addition will be compared to ensure that the field implementation is working appropriately.

Coordination and Collaboration

The study will be coordinated between the TSC, Mid-Pacific Region, and TFCF staffs and the interagency Tracy Technical Advisory Team (TTAT) through regular updates and meetings.

Endangered Species Issues

This study will not require permitting.

Dissemination of Results (Deliverables and Outcomes)

Results of the addition of oxygen into the existing holding tanks will be presented at a TTAT meeting. In addition, a technical memorandum or Tracy Volume Series will be written documenting the results.

Literature Cited

Bridges, B. 2010. Bureau of Reclamation, Tracy Fish Collection Facility, Byron, California, personal communication.

USBR (U.S. Bureau of Reclamation). 2010. *Multiprobe water quality data from the Tracy Fish Collection Facility, Byron, California.* Web accessible http://www.usbr.gov/pmts/tech_services/tracy_research/data/Multiprobe.html

Wedemeyer, G.A. 2001. *Fish Hatchery Management*, Second edition. American Fisheries Society, Bethesda, Maryland.